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(54) Abstract Title
Defining transmission power according to previous transmission powers

(57) In a TDMA (Time Division Multiple Access) cellular system offering broadband services and in which the number of time slots to be used for data transfer can be changed during the connection, the transmission power of a new time slot is defined in the mobile station on the basis of the transmission power of at least one other time slot used in the connection. If the connection has had one time slot for its use when a new time slot is being allocated, the transmission power of the new time slot is preferably set to the same value as the previous time slot. If the connection has had two or more time slots for its use when a new time slot is being allocated, the transmission power of the new time slot is preferably defined on the basis of the transmission powers of these other time slots according to a previously defined algorithm. As the algorithm, a minimum value, a maximum value or an average value can preferably be used.

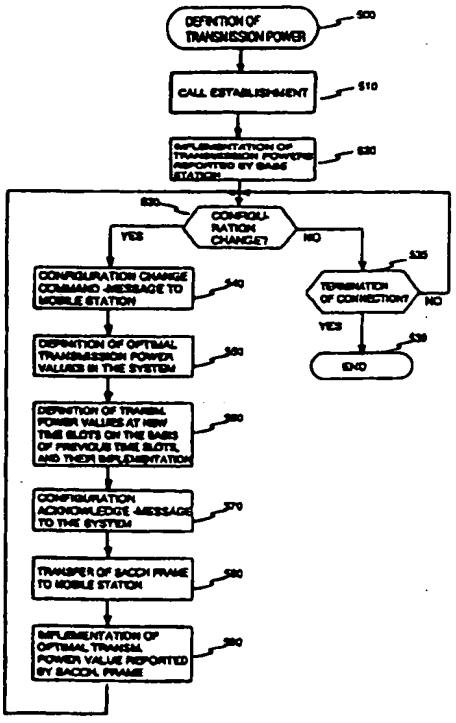

FIG. 5

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Fig. 5 shows a method according to the invention for defining transmission power; and

Fig. 6 shows a block diagram of a mobile station according to the invention.

Figs. 1-4 have been described above in the context of the description of the prior art.

Fig. 5 shows a method according to an embodiment of the invention for defining the transmission power of a new time slot in a mobile station when HSCSD connection is used. In it, connection is established 510, at which, according to prior art, a message is transferred from the mobile communication system to the mobile station reporting time slots to be used at the initiation of the connection and transmission power to be used at each time slot in an uplink transfer direction, which transmission power is further implemented on the connection, 520. Thereafter, it is monitored whether there is a need to change the connection configuration, 530. When a change in the connection configuration becomes necessary, the mobile communication system transmits to the mobile station a CONFIGURATION CHANGE COMMAND message informing the mobile station of the new configuration, 540. In addition, the mobile communication system defines the optimal transmission powers for the new time slots, 550.

Thereafter, the mobile station defines the transmission power for each new time slot in an uplink transfer direction. This occurs according to an embodiment of the invention on the basis of the transmission powers for time slots in an uplink transfer direction which were used prior to the reconfiguration, 560. The new time slot is implemented by using the transmission power defined in this manner. If the mobile station is able to control the new, proposed configuration, it responds to the system with a CONFIGURATION ACKNOWLEDGE message, 570.

Thereafter, the mobile station waits for the next SACCH signalling frame of the downlink transfer direction and, after having received it, phase 580, the mobile station reads from the L1 field of the SACCH frame the optimal transmission power value which has been defined for each new time slot. If this optimal value of the transmission power is not equal to the value calculated from the transmission powers of previous time slots, the transmission power is changed to be in accordance with the optimal value, 590. Finally, it remains vigilant to be ready to respond to a possible subsequent reconfiguration, 530, or the termination of the connection, 535, 539.

If one or more of the old time slots remain for the use of the connection after the reconfiguration, in that time slot, the same transmission power can preferably be used as before the reconfiguration.

If, prior to the implementation of a new time slot, only one time slot in the uplink transfer direction has been used in the connection, the transmission power for the new time slot is preferably the same as the transmission power for the old time slot used on that connection.

If, prior to the implementation of a new time slot, two or more time slots have been used in the connection, some mathematical function can be used in the definition of the transmission power for the new time slot, such as minimum/maximum values, averaging, or some other statistical method for calculating the expectation value.

If, for a new time slot, the maximum value of the transmission powers of the previous time slots is used, one achieves maximal certainty that the quality of data transfer at that time slot is adequate. Then, however, interference caused to other users of the same channel can be comparatively great.

If, for a new time slot, the minimum value of the transmission powers of the previous time slots is used, a minimal interference level is obtained for other users of the same channel, but the probability of a poor quality of connection increases. Also, when the minimum value is used, the power consumption of the mobile station is minimised.

When the average of the previous time slots is used, a compromise solution is obtained from the properties of the aforementioned two alternatives.

One method for defining the transmission power for a new time slot is to use the transmission power value of the main channel of the previous configuration. By a main channel, one means in an HSCSD connection of the GSM system, that (bidirectional) channel on which the main signalling of a multislot configuration is transferred, i.e. FACCH and SACCH signalling.

In addition to the transmission powers which were previously valid, in the definition one can also use the transmission power history of those which have been used in the connection, i.e. transmission power values which have been used earlier than just before the implementation of the new time slot. Thus one can take into consideration, for example, the possible translocation of the mobile station.

It should also be noted that when many new time slots are implemented, for each new time slot the transmission power value can be defined in a manner such that the transmission power values for the new time slots differ from each other.

Fig. 6 shows a simplified block diagram of a mobile station 600 according to an embodiment of the invention and its connection to the cellular system. The mobile station comprises an antenna 601 for receiving a radio frequency